points in the novaculite areas. One was visited by Mr. Griswold in 1888 and by Mr. Jenny, of the U. S. Geologic Survey, in 1891. At my suggestion the latter made collections of quartzite hammers and worked pieces of novaculite and forwarded the interesting notes which follow.

ANCIENT NOVACULITE MINES NEAR MAGNET COVE, HOT SPRINGS COUNTY, ARKANSAS.

BY W. P. JENNEY.

These old excavations are located on the top of the divide between the waters of Cove creek and Pleasant run, a branch of Ten Mile creek, about twelve miles east of Hot Springs. They consist of a number of shallow excavations upon the broad, rounded crest of the divide, covering a belt three hundred to six hundred feet in width, the workings following the general strike of the novaculite rocks at this point, to wit, N. 60 degrees to 70 degrees E. As far as I followed the divide—for a distance of one and a half miles—these workings continued, and are reported to extend, with breaks at intervals, an extreme distance of four miles southwesterly from this point. They are at present covered with soil and overgrown by oak timber of ordinary size. The excavations are nearly filled by the caving in of the loose waste from the surrounding dumps, but were evidently worked to a depth of fifteen to thirty or forty feet, apparently, as open cuts or trenches, following the purest and most valuable strata of the novaculite. Some are one hundred to three hundred feet in length, but the greater number of these workings consist of shallow pits twenty to fifty feet in length, probably ten to thirty feet in width originally, before caving, and fifteen to twenty-five feet deep, being opened at intervals irregularly along the course of the layers of the novaculite most useful to those doing the work.

The whole ridge is composed of novaculite, with a strike N. 65 degrees E., dipping south at fifty to sixty degrees. Most of the novaculite is coarse-grained, impure, and unsuitable for the manufacture of implements. On the crest of the divide several beds of novaculite outcrop, which are of very fine quality and are interbedded with the coarser strata. These pure beds are from five to twenty-five feet in thickness. The rock is white, yellowish, or bluish white in color, breaking readily with a smooth conchoidal fracture.

The range is broken in places by cross-ravines and low saddles. In one place a small brook flows nearly at right angles across the formation, exposing the upturned edges of the novaculite belt forming the crest of the divide, and the strata of pure rock are seen to be in line with the excavations on either side of this brook, while interbedded impure strata underlie the waste dumps intervening between the lines of excavation, showing conclusively that the old workings follow the beds of pure novaculite. The whole surface of the ridge in the vicinity is covered with chips of pink, red, or white novaculite, rarely dark-colored or black, and always having a fine-grained structure. The pure white agate-like novaculite being evidently the most worked and sought for, the waste dumps show that coarse-grained, impure, and much-fractured rock was discarded. Many of these flint chips show serrated edges, as if discarded after an attempt had been made to fashion an arrow head or cutting tool.

The tools used by these ancient miners appear to have been balls of stone or natural bowlders of three sizes, the smallest one and a half to two and a half inches in diameter, the second size three to four inches, and the largest six to eight inches in diameter; these bowlders or stone hammers are mostly dark grey syenite; some bowlders of hard igneous rocks as well as hard quartzite of grey and brown shades of color. None of these rocks occur in the ridge, these bowlders being evidently brought from the beds of streams draining the area covered by the eruptive rocks to the southeast, the nearest localities from which these tools could have been obtained being some two miles distant.

None of these stone hammers show grooves whereby they were attached to handles. Many fragments of broken hammers lie in the waste dumps, especially of the larger sizes which would be most frequently broken in working, the smaller being used probably in trimming the fragments of novaculite after they were quarried. Some of these stone hammers, especially in the more recent workings, are smooth and imperfectly polished, but the older dumps contain fragments of bowlders of granite and other igneous rocks which have undergone considerable decomposition since they were broken in use. Hard crystals of feldspar project from the surfaces of these ancient fragments by the action of weathering, and even the fractured surface of the broken bowlders is similarly weathered. These stone hammers are abundant in the old dumps, although large numbers are reported to have been carried away by former visitors. The

workings have evidently been made at different periods of time, some, evidenced by the weathering of the novaculite chips and the stone hammers, must be very old. In the extent of one and a half miles examined on the crest of this divide I would estimate the aggregate quantity of material which must have been excavated at 100,000 cubic yards. The neighboring ridges are covered by pine timber of good size. In the vicinity of the workings the timber is oak and resembles second growth. This may have resulted from the timber being destroyed by the ancient miners either for domestic purposes, or possibly for fire-setting in mining the novaculite.

PHYSICAL CULTURE IN CHINA.—The ingenious contrivance which the Ojibwas have for strengthening the muscles of the legs by wearing small bags of shot about the ankles, mentioned in Dr. Hoffman's "Remarks on Ojibwa Ball Play" (Amer. Anthrop., April, 1890, p. 133), recalls a similar custom among the Chinese.

A good many years ago, when I was living in the south of China, and working hard to acquire some knowledge of the language, I had a teacher who was an intelligent man, one of the lowest rank of the literati.

He used to delight in telling me about the wonderful feats of strength and agility performed by his brother, who was, according to *Lio siu tsai*, a mighty athlete in every way, but whose specialty was the high jump. I inquired by what course of training his brother had attained such remarkable power. He said that his brother first acquired great strength and flexibility of his leg muscles by squatting down until his haunches touched his heels, and then slowly raising himself until he stood upright on his toes; he would also, from the squatting position, spring up into the air as high as he could. His next step was to practice jumping until he could gain nothing more. Then he began to jump with small weights fastened to his feet; these weights were gradually increased until, with a weight of five catties (about 6⅔ lbs.) on each foot, he jumped as high as an ordinary man could. "Therefore," Lio wound up triumphantly, "when he took off the weights and jumped with all his power, he soared up into the air like a bird!"

Although my teacher's figures may be open to criticism, I do not doubt that his brother *did* use the weights, thinking to derive some benefit from such training.